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ABSTRACT

Using a recursive network transition model for depicting stories to generate two stories of contrasting structure (successive episodes organized by topic and embedded episodes organized by failed and successful goals), a study examined the understanding of the structures by having children in the third through eleventh grades rate each story statement for its importance relative to the story as a whole. One hundred ninety-three third graders, 205 sixth graders, 179 ninth graders, and 180 eleventh and twelfth graders participated in the original study (van der Broek, 1985). The two stories used for this study contained nearly identical content--the difference between them being that the episodes and constituent sentences had been restructured, providing two contrasting networks of statements and their relations (sequentially and hierarchically), implying different meanings of the events. Data showed that the understanding of relations within episodes preceded understanding of relations between episodes. Results indicated that story comprehension developed out of local understanding of, and inferring causal relations between story statements about actions and states. Local coherence at the level of pairs of sentences leads to global coherence of the narrative discourse. (Seven tables of data and eight figures are included.) (MM)

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THE ACHIEVEMENT OF GLOBAL COHERENCE THROUGH LOCAL CAUSAL INFERENCES IN NARRATIVE COMPREHENSION & PRODUCTION

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ABSTRACT

A recursive network transition model for depicting stories is described. The model assumes that stories are organized locally by knowledge of the events and their causal relations. These relations are inferred and give rise to episodes as well as their higher order structuring, resulting in story variation of wide complexity.

The model was used to generate two stories of contrasting structure: Successive episodes organized by topic and embedded episodes organized by failed and successful goals. Understanding of these structures was investigated by having children in third through eleventh grades rate each story statement for its importance relative to the story as a whole.

The data show that the understanding of relations within episodes precedes that of between episodes. Third grade children understood as well as their older peers the importance of goals, actions and outcomes in anchoring episodes and the importance of goals in motivating large number of actions within the episode. Sixth grade children, however, showed more integration of information across episodes in that they understood the importance of how failed outcomes generate new goals and how successful actions and outcomes enable other actions in episodes. Ninth grade children showed an emergence of higher order understanding on the importance of settings in organizing episodes topically in successive stories and on the importance of initiating events in determining the lengthy causal chains of embedded stories.

The developmental data indicate that story comprehension develops out of local understanding of and inferring causal relations between story statements about actions and states. This achievement leads to further integration of states and actions into episodes, and of episodes into higher order organizations. In this sense, local coherence at the level of pairs of sentences leads to global coherence of the narrative discourse.

In this symposium, Nancy Stein (1986) has presented evidence that children tell stories that vary in complexity from simple descriptive states to complex, embedded episodic structures. The changes in these structures correspond to changes in age and knowledge. The changes in structure also correspond to changes that the children produce in the story themes, in the protagonist's goals, in the kind of goal conflicts and in the manner of conflict resolution.

The development of the child's ability to generate and to comprehend narrative discourse of this complexity depends on growing knowledge of the social and physical world, and application of this knowledge via naive theories of physical and psychological causality. This application uses:

1. knowledge about the kinds of problems that animate beings encounter and solve
2. knowledge about the goals and plans that result from these problems,
3. knowledge about the plans and actions that may be carried out in the service of these goals,
4. knowledge about the consequences of pursuing a course of action, and
5. knowledge about internal states other than intentions such as thoughts, beliefs, and feelings that accompany the problems and their solutions.

With development, as the stories become more complex, they also become coherent. They form more than a series of unrelated states and actions. Rather, they form a highly integrated (coherent) sequence. The question of interest in this paper is: How is such coherence achieved?

The claim is made that global coherence is achieved by the storyteller or the story comprehender alike through a local means: making causal inferences between the states and actions that are encoded by sentences. Local coherence results from an interaction between generic knowledge and specific states, actions or state changes in the narrative flow. Singular events activate general knowledge, set up general expectations, and provoke causal inferences. The content of the event constrains what is activated, what is expected and what relations are inferred between states and actions. Together, these outcomes form a continuously changing set of circumstances that constrain the generation and interpretation of subsequent states and actions, contributing to the feeling of coherence.

To illustrate how coherence may be built from local constraints, consider how one might go about understanding the following change in state:

(5) John became angry.

Suppose the story teller had previously informed you that

(4) John's brother had taken and broken John's favorite HEMAN toy.

Suppose further that you had been told:

(1) John was a 4-year-old boy and

(2) John really liked this toy and
(3) John played with it all the time.

By now, you would have inferred relations between John's brother's action and John's change in state. In the circumstances of John's being four years in age, and the HE-MAN's being John's favorite toy, the belief that John would not have become angry if his brother had not broken the toy becomes strengthened.

If you were now told that:
(6) John wanted to hit his brother,
you would probably express no surprise. According to Stein & Levine's (1986) analysis of emotions, aggression toward the agent of actions that result in the loss of valued objects is a likely outcome and forms a part of the meaning of anger.

Further, the statements:
(7) John hit his brother,
(8) His brother cried, and
(9) Their mother rushed into the room.
complete a coherent sequence that is called an episode.

In stories, the episode is a central unit. It has psychological reality and serves to organize experience into higher-order units. In Stein's (1986) corpus of stories told by children, the emergence of the episode corresponds to the emerge of causal, reactive and goal-directed action sequences.

INSERT FIGURE 1 ABOUT HERE

In the top of Figure 1, the General Transition Network Model that Paul van den Broek and I (Trabasso & van den Broek, 1985) developed to capture the classified content and structural properties of stories is displayed. The model represents an amalgamation of several approaches to story representation including aspects of the story grammars (Mandler & Johnson, 1977; Rumelhart, 1975; Stein & Glenn, 1979), causal chain analysis (Schank, 1975; Lehnert, 1978), plot unit analysis (Lehnert, 1982), and hierarchical approaches (Black & Bower, 1980; Rumelhart, 1977; Lichtenstein & Brewer, 1980).

The basic unit of the model is the individual state or action. These states and actions are organized into episodes by causal and temporal inferences. An episode consists of a setting (denoted by S), an initiating event (denoted by E), a reaction (denoted by R), a goal (denoted by G), actions (denoted by A), and outcomes (denoted by O).

To instantiate the model, we can substitute the previous nine sentences of the John story for each of the statement category symbols:

(1) Setting (S): John was a 4-year-old boy and
(2) Setting (S): John really liked this toy and
(3) Setting (S): John played with it all the time.
(4) Initiating Event (E): John's brother broke the toy.
(5) Reaction (Emotion) (R): John became angry.
(6) Goal (G): John wanted to hit his brother.

(7) Attempt-Outcome (A/O): John hit his brother.
(8) Reaction (Emotion) (R): His brother cried.
(9) Reaction (Action) (R): Their mother rushed into the room.

Note the processes of comprehension that we go through in understanding this episode. First a set of circumstances is introduced in the Setting from which we infer a context of a little, four-year old boy named John who values a toy. An initiating Event occurs wherein John's brother breaks the toy. This leads to set of inferences that John's brother broke John's valued toy and sets up expectations that John will react in some way. His Reaction is one of (justifiable) anger and we infer that the reason John is angry is because his brother broke his valued toy. The anger Reaction sets up further expectations that John might want to do something, and we experience it, namely the Goal of wanting to hit his brother. We now expect that John will act on this goal in some way. We also infer that John wanted to throttle his brother because he was angry that his brother had broken his valued toy. When we are told of the Attempt/Outcome of John hitting his brother, we infer that this occurred because John wanted to hit his brother out of anger over his brother's breaking his valued toy. The setting of John's being a four-year-old boy allows us to infer the act of hitting as being plausible in the circumstances. We expect some further or consequences of the action and find out that John's brother's Reaction was to cry. We infer that his crying was caused by being hit by John who was angry at his brother for having broken his valued toy. We have further expectations about Outcomes or Reactions. These are instantiated when another Reaction occurs with the mother rushing into the room. We infer that the mother's reaction of rushing into the room was caused by the brother's crying in response to John's hitting him out of anger over his brother's breaking his valued toy. We thus can see how causal inferences integrate the series of actions into a unit.

In our analysis when the goal is achieved, the episode ends. In this case, John's action achieves his goal but it, in turn, has further consequences and begins a new episode involving the mother, the brother and John.

In our approach to the representation of events in narratives, meaning is defined in terms of the relations of states and actions to one another (Trabasso, Secco & van den Broek, 1984; Trabasso & Sperry, 1985; Trabasso & van den Broek, 1985). These relations occur through causal and temporal and other, logical inferences that are made locally on a new statements in the context of the prior statements.

In the model of Trabasso & van den Broek (1985), the categorical nature of the content in the episode and the causal chaining between the categorized content can be generalized by allowing the categories to be recursive. From the episodic, one can constrain relations between states (e.g. goals), actions and state changes (outcomes) so that one can generate or describe virtually any story structure.

In addition to the general transition network model, Figure

1 shows two specific realizations of the model that contrast markedly in structure, and, as we shall see, they also contrast markedly in meaning:

1. one representation with episodes that follow one another sequentially, and
2. a second representation with episodes that are embedded by failed or attained goals and outcomes.

INSERT TABLE 1 ABOUT HERE

In the sequential episodic stories, the episodes follow one another in time and can either cause, enable or merely temporally succeed other episodes. On the second page of the handout, Table 1 shows a sequential story in which each episode enables another. In the first episode, we are told that Jimmy wants a job and obtains a paper route. In the second episode, Jimmy wants to save $100 and he earns it, an outcome that is enabled by the first episode. In the third episode, Jimmy wants a bike and he buys one, an outcome enabled by his having earned and saved money in the first episode. For reference, the causal network representation for this story is shown on the left side in Figure 2.

INSERT FIGURE 2 AND TABLE 2 ABOUT HERE

Alternatively, in the outcome embedded story shown in Table 2, Jimmy's goals are met with unexpected outcomes that do not satisfy his initial goal and now he must generate new, subordinate goals in order to achieve that goal. This results in a hierarchical structure of the episodes wherein, Jimmy wants a bike but discovers that he does not have enough money. This leads to a goal of obtaining the money but when Jimmy asks his mother, he fails as she tells him to earn his own money by getting a job. This leads to Jimmy wanting a job and obtaining one by getting a paper route. Having the paper route and wanting to save money enables and motivates him, respectively, to work hard and earn it. Having the money and wanting to buy the bike enables and motivates him, respectively, to obtain the desired bike. The causal network representation for this story is shown in Figure 3.

INSERT FIGURE 3 ABOUT HERE

In reading each version of the Jimmy story, note one the important feature that the two stories contain nearly identical content. The difference between them is that the episodes and constituent sentences have been restructured, providing two contrasting networks of statements and their relations, and very different meanings of the events.

To understand this, reflect on the reasons why Jimmy: Wants a bike? Wants a paper route? Wants to save $100? in each of the versions. The change in meaning of an event reflects the change

in what is related to each of the events. That is, its meaning shifts as there are changes in its causal antecedents and consequences.

Trabasso & Sperry (1985) tested the idea that a statements importance in a text depended upon its relation to other statements in the story structure. In this study, six Chinese and Japanese folktales (taken from another study by Brown & Smiley (1977) were analyzed according to their causal network representations. Brown & Smiley had used these stories to assess children's and adults' abilities to identify important ideas in narrative texts. The Father, His Son and Their Donkey, shown in Table 3 parsed according to "pausal units" by Brown & Smiley, is an example. Table 3 also shows the mean importance rank for each unit (the highest value being 4 and the lowest is 1).

INSERT TABLE 3 AND FIGURE 4 ABOUT HERE

A causal network for the story is shown in Figure 4.

Basically, the story is about a father and son who try to take their donkey to the marketplace in a nearby town. Along route, they are interrupted by various travelers who criticize them, In each case they try to please the critics but end up being criticized by the next traveler they meet. In the end, the moral is that they tried to please everyone end up pleasing no one and they lose their donkey ("ass" in the original) as well.

Note that statements (2), (61) and (62) have the largest number of connections to other statements and are among the most important. Statement (2) is a goal statement that organized a series of actions of going to a market place in order to sell the donkey. Statements (61) and (62) contain the moral that refers to all the attempts to please and fail.

INSERT FIGURE 5 ABOUT HERE

Figure 5, on the right, shows that these judgments were linearly related to the number of connections that each statement had in our analysis. Thus, the most important statements to the text as a whole had the most relations to other statements in the text.

Out of concern with the development of abilities to determine important ideas in text, Paul van den Broek carried out a thesis under my direction (van den Broek, 1985) that serves as the basis for the remainder of this talk. His goal was examine how well children integrate information within and between episodes as reflected in their ability to judge the importance of statements to the story as a whole. The criterion was that a statement was important to the extent that if it were deleted from the story, the story would lose meaning. van den Broek tried to affect the importance judgment for identical statements by varying their causal role. This was achieved by embedding the statements in different story structures or by variation in the number of causal relations between pairs of statements. In this

manner, he controlled for content across story versions.

In order to vary the importance of the goals, independently of their position in the goal hierarchy, the number of actions that were motivated by each goal was varied. Thus, the number of connections or relations for a goal varied. The question of interest here was whether the child integrates information within the episode and therefore has a basis for understanding the importance of the goal in organizing it, independent of other factors.

Several other approaches to narrative representation have assumed that the hierarchical structure of a text determines the importance of statements (Black & Bower, 1980; Rumelhart, 1977). By varying the hierarchical level of the goals independent of their connections, both structural factors could be investigated.

Some examples of van den Broek's (1985) stories will help you see how the number of relations may vary independently of hierarchical structure.

INSERT TABLE 4 AND FIGURE 6 ABOUT HERE

Examine first, the increasing version of the hierarchical Jimmy story in Table 4. The study Figure 6 that shows its network representation. In the table and in the figure, the goal statements are marked for convenience: Goal 1 is statement (6), Goal 2 is statement (9) and Goal 3 is statement (13). Together, they form a hierarchy in that the super-ordinate goal is G1, the first subordinate goal is G2 and the most subordinate goal is G3. In the increasing version, however, G1 has 4 connections, G2 has 8 connections and G3 has 12 connections. Thus, the lowest order goal has the highest number of connections.

Now turn to Table 5 and Figure 7 which depict the decreasing version of the Jimmy story.

INSERT TABLE 5 AND FIGURE 7 ABOUT HERE

Here, G1 is statement (6), G2 is statement (15) and G3 is statement (19). In contrast to the increasing version, the decreasing version correlates hierarchical position with number of relations. Thus, G1 has 12 connections, G2 has 8 and G3 has only 4.

Ask yourself, after reading each version, what was the story about, and you might reply: "For the decreasing version, the story is mostly about Jimmy wanting and getting a bike. However, the increasing version is mostly about Jimmy wanting and getting a job."

van den Broek (1985) tested a total of 756 students distributed over four grade levels: third (N=193), sixth (N=205), ninth (N=179), and eleven-twelfth (N=180) grades. Each student in each grade rated the importance of each statement in two stories having the same structure.

INSERT FIGURE 8 ABOUT HERE

Figure 8 shows the first result of interest: Independent of age, the importance of goal statements was determined solely by the number of relations it had. That is, goals having more connections were rated as more important while the hierarchical position of a goal had no effect (even when the goals were matched for content across structures).

Third grade children (7-years old) rated the goals with more connections as more important to the same degree as did the juniors and seniors in high school (16 to 18 years old). Thus, by age seven or eight, children show evidence of integrating information within episodes by understanding that goals direct actions and lead to outcomes.

INSERT TABLE 6 ABOUT HERE

The second result of interest has to do with global structures how the importance of their events interacted with age. In the successive episodic story, the structure is topical with Jimmy organizing the three episodes. In a way, the story is about three events in the life of Jimmy. However, in the hierarchical story, the episodes are embedded and are organized around the super-ordinate goal of Jimmy's wanting a bike. The event that initiates this goal, namely Jimmy's seeing his friend's new bike, is the cause that begins the long chain of events. In this case, the initiating event takes on more causal importance than in the sequential story where it is restricted to only one episode.

The categories of interest are illustrated in Table 2. The data in Table 6 indicate that the children were sensitive to these more global properties. Settings for sequential episodic stories were rated as more important than those for hierarchical properties. In contrast, initiating events were rated as more important for hierarchical stories than for sequential stories.

Two other, subsidiary findings in Table 6 are of interest with respect to inter-episodic integration:

Outcomes that attain goals are called successful outcomes whereas those that indicate goal failure are called failed outcomes. Across the two structures, successful outcomes do not vary in their relations: both end episodes and enable other actions or outcomes. The data indicated that the children understood this since they did not distinguish the successful outcomes as to importance. However, across the two structures, failed outcomes differ in their causal consequences. In the hierarchical versions, failed outcomes generate new, subordinate goals whereas in the sequential version, they are replaced with another action in the service of the same goal.

Hence, contrary to Black & Bower (1980) who claimed that failed outcomes were unimportant (and therefore would be recalled less well than successful ones), the failed outcomes that had

causal consequences in the hierarchical versions were rated as more important than those that did not and as well as successful outcomes.

The above factors did, however, interact with age and show that children become increasingly more sensitive to the inter-episodic structural roles of statements in the story. They become more sensitive to the importance of settings as topical organizers in sequential episodic stories, of outcomes that generate subordinate goals and to the goal-action-outcome roles within episodes.

INSERT TABLE 7 ABOUT HERE

The three sub-tables of Table 7 summarize the following findings:

In Table 7a, the importance of goals and outcomes increase, while those for actions decrease with age. These differences become marked by grade six (age 11). Goals and outcomes anchor episodes and interconnect them. Attempts are largely intra-episodic in nature. Thus, the third graders show a slight discrimination between goals, actions and outcomes as to their importance; by grade six, the distinctions are more marked. We would say, then, that third graders probably detect some role of goals and outcomes locally causing other goals but they do not achieve the same degree of understanding of these categories in relating episodes as do the children in the higher grades.

In Table 7b, we see that for failed outcomes, the difference favoring the hierarchical over the sequential story also appears to become more marked by grade six. Here, the children are recognizing that outcomes that generate new, subordinate goals are more important than ones that do not, another inter-episodic relation.

In Table 7c, we see that settings in the sequential story structure were rated as more important and that the difference between the two structures becomes larger with age. The difference is most marked by the ninth grade, indicating that this highest form of organization is being achieved later than relating episodes causally.

These data indicate that while third graders did not differ from their older counterparts in recognizing the importance of goals in relations to the number of actions that they motivate, they were less likely to identify the importance of units that anchor and interrelate episodes by goals, failed outcomes, and successful outcomes. By eleven years or the sixth grade, children understand the importance of these events that link episodes into higher order structures. By the late teens, they are able to appreciate topical organization by settings.

These differences in understanding the structural importance of events probably arise from differences in the degree of integration achieved by the children. Third graders appear to integrate information by making causal and temporal inferences

well within episodes and possibly, at a local level, between outcomes and the goals they generate. Sixth graders, on the other hand, achieve more integration of events causally and recognize the importance of relations between episodes in terms of hierarchical goal and outcome structures. Finally, by adolescence, the ninth graders are showing still greater integration by recognizing that episodes themselves can be related to topical or setting statements. The degree of integration achieved can be directly measured by appropriate causal questioning of key goals, actions and outcomes (Trabasso, van den Broek & Liu, in press).

The identification of the meaningful role that events play in the structure of the story, revealed by the causal network analysis of our model, not only attests to the model's usefulness in depicting story structure but supports the general argument that causal inferences form the local cohesive ties between events that give rise to episodic and higher order organizations of narratives. The developmental data, moreover, correspond and validate this claim. The inferences that relate events between individual statements within and between episodes give rise to the global coherence of the story. The making of these inferences appears to follow a developmental sequence, manifested clearly by ages seven, eleven and fourteen.

The basic building block of an inferred causal relation between individual statements is thus crucial to a meaningful interpretation of stories. These inferences are predicated upon the child's knowledge of the individual sentences and the concepts embedded within them. However, when they occur, the organize the statements into a connected discourse at the level of the episode. The child's understanding of goals--> actions-> outcomes is crucial to the construction or generation of these structural units. Goals and outcomes further restructure the stories through goal plans and new goals. This knowledge and understanding gives rise to the child's ability to integrate information not only between statements but also between episodes and to organize the episodes into higher order structures. This kind of integration allows the generation and understanding of complex, multi-episodic and embedded stories of the kind that Nancy Stein (1986) identified in her corpus of stories told by children.

In conclusion, the development of story production and understanding would seem to entail: (1). The development of causal schemata that allow the child to infer or predict causes and consequences from single states and actions as they occur within a set of circumstances established by the story context. (2). The development of an ability to organize the results of these inferences into goal-action-outcome, episodic structures. (3). The discovery of relations that link episodes into higher order structures and to use this discovery to construct or plan and generate complex narratives.

At base, the meaning of states and actions is relational in nature with causal, temporal and logical relations providing the

cement of the story universe.

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TABLE 1
SEQUENTIAL VERSION OF THE JIMMY STORY
(from van den Broek, 1985)

1. There once was a boy named Jimmy.
2. One day, Jimmy was talking to his mother.
3. Jimmy had a lot of spare time.
4. Jimmy's mother suggested that he should get a part-time job.
5. Jimmy wanted to get a paper route.
6. Jimmy studied the paper routes.
7. Jimmy called the newspaper office.
8. The secretary told him to come and to talk to the sales manager.
9. Jimmy borrowed his brother's bike.
10. Jimmy went to the newspaper office.
11. Jimmy asked the manager about a paper route.
12. Jimmy told the manager that he has a bike.
13. Jimmy also told the manager that he knows the town very well.
14. The manager offered Jimmy a paper route near his home.
15. Jimmy accepted the paper route.
16. Jimmy began to earn money.
17. Jimmy did not have much money.
18. Jimmy wanted to save $100.
19. Jimmy went to his mother.
20. Jimmy asked his mother for some money.
21. Jimmy's mother said that he should earn his own money.
22. Jimmy got up before sunrise.
23. Jimmy folded the papers carefully.
24. Jimmy delivered the newspapers before sunrise.
25. Jimmy put out a paper near each door.
26. Jimmy made sure he did not miss any house.
27. The people on his paper route were very pleased.
28. The people gave Jimmy a lot of tips.
29. Jimmy worked until he earned the $100.
30. One day, Jimmy saw Tom's new 10-speed bike.
31. Jimmy thought that the bike was "neat".
32. Jimmy did not have a 10-speed bike.
33. Jimmy wanted a 10-speed bike.
34. Jimmy called several bike shops.
35. Jimmy asked about the price of bikes.
36. Jimmy found the lowest price for a 10-speed bike.
37. Jimmy went to the bike shop.
38. Jimmy looked at all the bikes.
39. Jimmy picked out a 10-speed bike.
40. Jimmy gave the shop owner the money.
41. Jimmy rode his new bike home.
42. Jimmy was pleased with his bike.

TABLE 2
HIERARCHICAL VERSION OF THE JIMMY STORY
(from van den Broek, 1985)

1. There once was a boy named Jimmy. (Setting)
2. One day, Jimmy met Tom.
3. Jimmy say Tom's 10-speed bike. (Initiating Event)
4. Jimmy thought that the bicycle was "neat".
5. Jimmy did not have a 10-speed bike.
6. Jimmy wanted a 10-speed bike. (Goal 1)
7. Jimmy asked Tom where he got his bike.
8. Tom said he bought it in a bike shop.
9. Jimmy called several bike shops.
10. Jimmy asked about the price of bikes.
11. Jimmy found the lowest price for a 10-speed bike.
12. Then Jimmy counted his money. (Failed Attempt)
13. The amount of money was not enough to buy a bike. (Failed Outcome)
14. Jimmy wanted to save $100. (Goal Two)
15. Jimmy went to his mother.
16. Jimmy asked her for some money. (Failed Attempt)
17. Jimmy's mother said that he should earn his own money. (Failed Outcome)
18. Jimmy wanted to get a paper route. (Goal Three)
19. Jimmy to a map of the town.
20. Jimmy studied the paper route.
21. Jimmy borrowed his brother's bike.
22. Jimmy went to the newspaper office.
23. Jimmy asked the manager about a paper route.
24. Jimmy told the manager that he has a bike.
25. Jimmy also told the manager that he knows the town very well. (Successful Attempt)
26. The manager offered him a paper route near his house. (Successful Outcome)
27. Jimmy accepted the paper route.
28. Jimmy folded the papers neatly.
29. Jimmy delivered the papers early in the morning.
30. Jimmy put a paper near each door.
31. Jimmy made sure that he did not miss any house. (Successful Attempt)
32. The people on his paper route were very pleased.
33. The people gave Jimmy a lot of tips.
34. Jimmy worked until he earned the $100. (Successful Outcome)
35. Jimmy picked out a 10-speed bike. (Successful Attempt)
36. Jimmy rode his new bike home. (Successful Outcome)
37. Jimmy was pleased with his bike.

TABLE 3
(data from Brown & Smiley, 1977)

The Father, his Son and their Donkey

Pause Units	Average Importance
1. A father and his son	3.35
2. were taking their donkey to town	3.41
3. to sell him	2.71
4. at the marketplace.	1.29
5. They had not gone a great distance,	1.24
6. when they met a group of pretty maidens	2.65
7. who were returning from the town.	1.24
8. The young girls were talking and laughing,	1.41
9. when one of them cried out, "Look there.	1.94
10. Did you ever see such fools,	3.00
11. to be walking alongside the donkey when they might be riding on it?"	3.47
12. The father, when he heard this,	1.82
13. told his son to get up on the donkey,	3.41
14. and he continued to stroll along merrily.	1.94
15. They traveled a little further down the road,	1.29
16. and soon came upon a group of old men talking.	2.76
17. "There," said one of them,	1.59
18. "that proves what I was saying.	2.00
19. What respect is shown to old age in these days?	3.53
20. Do you see that idle boy riding the donkey,	3.18
21. while his father has to walk?	3.18
22. You should get down	2.41
23. and let your father ride!"	3.06
24. Upon this, the son got down from the donkey	2.94
25. and the father took his place.	3.35
26. They had not gone far	1.12
27. when they happened upon a group of women and children.	2.41
28. "Why, you lazy old fellow,	2.76
29. you should be ashamed,"	2.76
30. cried several women at once.	1.35
31. "How can you ride upon the beast,	2.82
32. when that poor little boy can hardly keep up with you?"	3.59
33. So the good-natured father hoisted his son up behind him.	3.47
34. By now they had almost reached the town.	1.59
35. "Tell me friend," said a townsman,	1.65
36. "is that donkey your own?"	2.12
37. "Why yes," said the father.	1.94
38. "I would not have thought so," said the other,	2.41
39. "by the way you overwork him.	3.18

40.	Why, you two are strong	2.29
	(Table 3 continued)	
41.	and are better able to carry the poor beast than he is to carry you."	3.47
42.	"Anything to please you sir," said the father,	2.71
43.	"we can only try."	2.41
44.	So he and his son got down from the donkey.	3.00
45.	They tied the animal's legs together,	2.88
46.	and, taking a pole,	1.65
47.	tried to carry him on their shoulders	3.47
48.	over a bridge	1.59
49.	that led to the marketplace.	1.41
50.	This was such an odd sight	2.00
51.	that crowds of people gathered around to see it,	2.65
52.	and to laugh at it.	2.18
53.	The donkey, not liking to be tied,	3.06
54.	kicked so ferociously	2.71
55.	that he broke the rope,	2.94
56.	tumbled off the pole into the water,	2.88
57.	and scrambled away into the thicket	3.00
58.	With this,	1.12
59.	the father and his son hung down their heads	2.65
60.	and made their way home again,	1.94
61.	having learned that by trying to please everybody,	3.65
62.	they had pleased nobody,	3.82
63.	and lost the donkey too.	3.76

TABLE 4
INCREASING (4-8-12) HIERARCHICAL VERSION
(from van den Broek, 1985)

1. There once was a boy named Jimmy
2. One day, Jimmy met Tom.
3. Jimmy saw Tom's new, 10-speed bike.
4. Jimmy thought that the bike was "neat".
5. Jimmy did not have a 10-speed bike.
6. G1: Jimmy wanted a 10-speed bike.
7. Then Jimmy counted his money.
8. The amount of money was not enough to buy a bike.
9. G2: Jimmy wanted to save $100.
10. Jimmy went to his mother.
11. Jimmy asked her for some money.
12. Jimmy's mother said that he should earn his own money.
13. G3: Jimmy wanted to get a paper route.
14. Jimmy got a map of the town.
15. Jimmy studied the paper routes.
16. Jimmy called the local newspaper office.
17. Jimmy asked the secretary for a paper route.
18. The secretary told Jimmy to come and talk to the sales manager.
19. Jimmy borrowed his brother's bike.
20. Jimmy went to the newspaper office.
21. Jimmy asked to see the manager.
22. Jimmy asked the manager about a paper route.
23. Jimmy told the manager that he has a bike.
24. Jimmy told the manager about his previous jobs.
25. Jimmy described to the manager details about several paper routes.
26. The manager offered him a paper route near his house.
27. Jimmy accepted the paper route
28. Jimmy folded the papers neatly.
29. Jimmy delivered the papers early in the morning.
30. Jimmy put a paper near each door.
31. Jimmy folded the papers neatly.
32. The people on his paper route were very pleased.
33. The people gave Jimmy a lot of tips.
34. Jimmy worked until he earned the $100.
35. Jimmy picked out a 10-speed bike.
36. Jimmy rode his new bike home.
37. Jimmy was pleased with his bike.

TABLE 5
DECREASING (12-8-4) HIERARCHICAL VERSION
(from van den Broek, 1985)

1. There once was a boy named Jimmy
2. One day, Jimmy met Tom.
3. Jimmy saw Tom's new, 10-speed bike.
4. Jimmy thought that the bike was "neat".
5. Jimmy did not have a 10-speed bike.
6. G1: Jimmy wanted a 10-speed bike.
7. Jimmy asked Tom where he got his bike.
8. Tom said that he bought it at a bike shop.
9. Jimmy called several bike shops.
10. Jimmy asked about the price of bikes.
11. Jimmy wrote down the prices given to him over the phone.
12. Jimmy found the lowest price for a 10-speed bike.
13. Then Jimmy counted his money.
14. The amount of money was not enough to buy a bike.
15. G2: Jimmy wanted to save $100.
16. Jimmy went to his mother.
17. Jimmy asked her for some money.
18. Jimmy's mother said that he should earn his own money.
19. G3: Jimmy wanted to get a paper route.
20. Jimmy borrowed his brother's bike.
21. Jimmy went to the newspaper office.
22. Jimmy asked the manager about a paper route.
23. The manager offered him a paper route near his house.
24. Jimmy accepted the paper route.
25. Jimmy folded the papers neatly.
26. Jimmy delivered the papers early in the morning.
27. Jimmy put a paper near each door.
28. Jimmy made sure that he did not miss any house.
29. The people on his paper route were very pleased.
30. The people gave Jimmy a lot of tips.
31. Jimmy worked until he earned the $100.
32. Jimmy went to the bike shop.
33. Jimmy looked at all the bikes.
34. Jimmy picked out a 10-speed bike.
35. Jimmy gave the shop owner the money.
36. Jimmy rode his new bike home.
37. Jimmy was pleased with his bike.

TABLE 6
(data from van den Broek, 1985)

AVERAGE IMPORTANCE RATINGS FOR CATEGORIES
IN HIERARCHICAL AND SEQUENTIAL STORIES

	Story Structure	
Category	Hierarchical	Sequential
Setting	3.21	3.67**
Initiating Event	3.11	2.39**
Goal	3.77	3.79
Failed Attempt	3.10	2.80**
Failed Outcome	3.73	3.10**
Successful Attempt	3.34	3.34
Successful Outcome	3.83	3.83

** p< .01

TABLE 7
(data from van den Broek, 1985)

A: AVERAGE IMPORTANCE RATINGS FOR
GOALS, SUCCESSFUL ATTEMPTS & OUTCOMES

GRADE	GOAL	SUCCESSFUL ATTEMPT	SUCCESSFUL OUTCOME	OVERALL
3	3.58	3.34	3.54	3.48
6	3.76	3.47	3.83	3.69
9	3.79	3.19	3.87	3.62
11/12	3.94	3.24	4.09	3.75
OVERALL	3.77	3.30	3.83	

B: AVERAGE IMPORTANCE RATINGS FOR
FAILED OUTCOMES IN HIERARCHICAL AND SEQUENTIAL VERSIONS

GRADE	HIERARCHICAL	SEQUENTIAL
3	3.45	3.34
6	3.75	3.23
9	3.79	3.29
11/12	3.86	3.03

C: AVERAGE IMPORTANCE RATINGS FOR
SETTINGS IN EACH STRUCTURE

GRADE	HIERARCHICAL	SEQUENTIAL
3	3.33	3.47
6	3.39	3.48
9	2.97	3.94
11/12	3.06	4.02

FIGURE CAPTIONS

Figure 1. General recursive transition network model (Trabasso & van den Broek, 1985) and examples of sequential and hierarchical story networks.

Figure 2. Causal network representation for the Sequential Version of the Jimmy Story (from van den Broek, 1985).

Figure 3. Causal network representation for the Hierarchical Version of the Jimmy Story (from van den Broek, 1985).

Figure 4. Causal network representation for the Father, his Son, and their Donkey story (from Trabasso & Sperry, 1985).

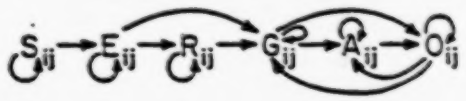
Figure 5. The relation between importance ratings and number of causal connections of a story statement (data from Trabasso & Sperry, 1985).

Figure 6. Representation of the Increasing Connection Hierarchical Jimmy Story (from van den Broek, 1985).

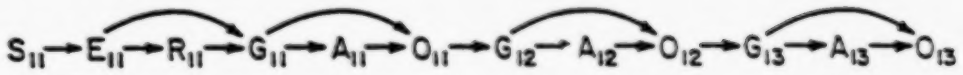
Figure 7. Representation of the Decreasing Connection Hierarchical Jimmy Story (from van den Broek, 1985).

Figure 8. Goal statement importance as a function of causal connections and hierarchical level (data from van den Broek, 1985).

General Recursive Transition Network



Sequential Episodes



Hierarchical Episodes

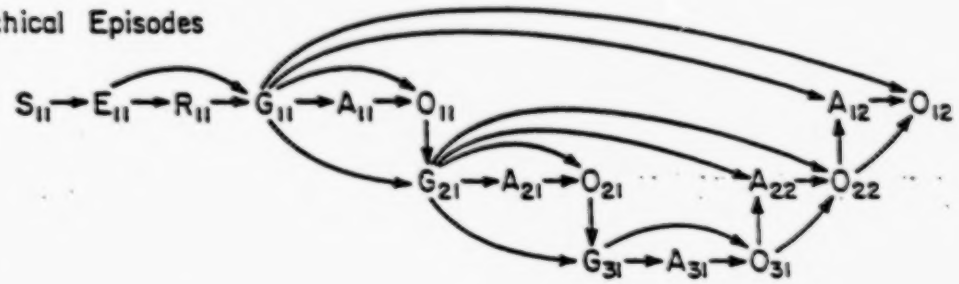


Figure 1. General recursive transition network model (Trabasso & van den Broek, 1985) and examples of sequential and hierarchical story networks.

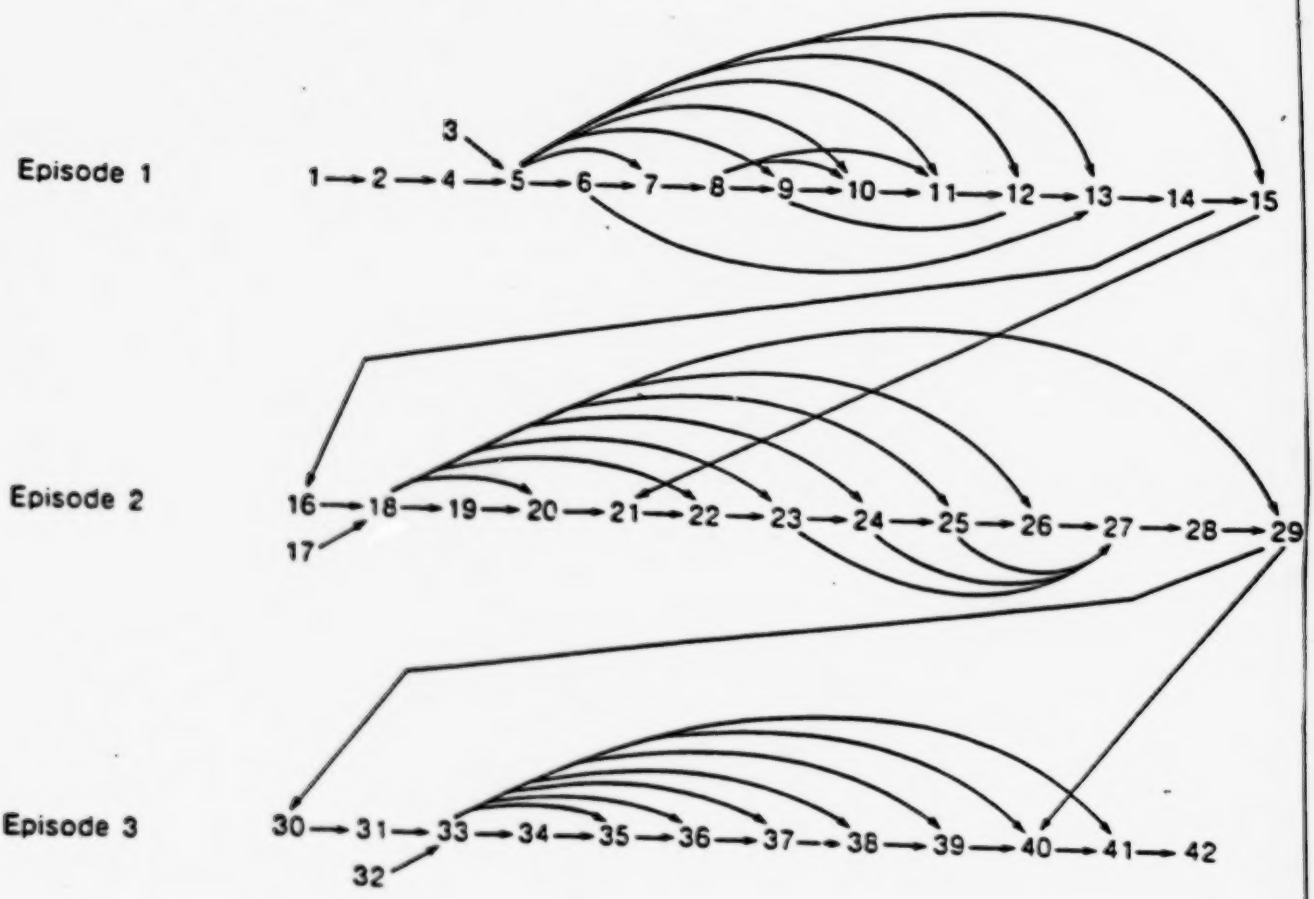


Figure 2. Causal network representation for the Sequential Version of the Jimmy Story (from van den Broek, 1985).

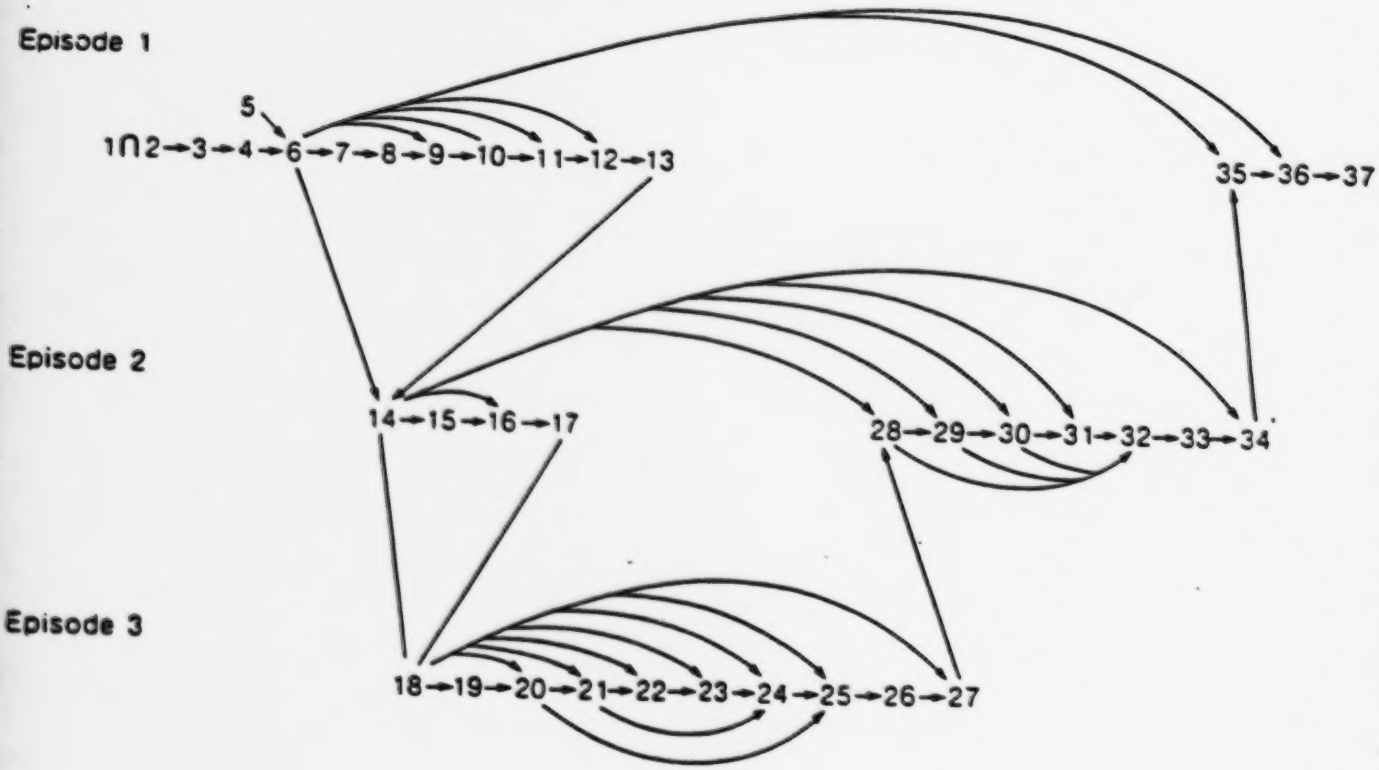
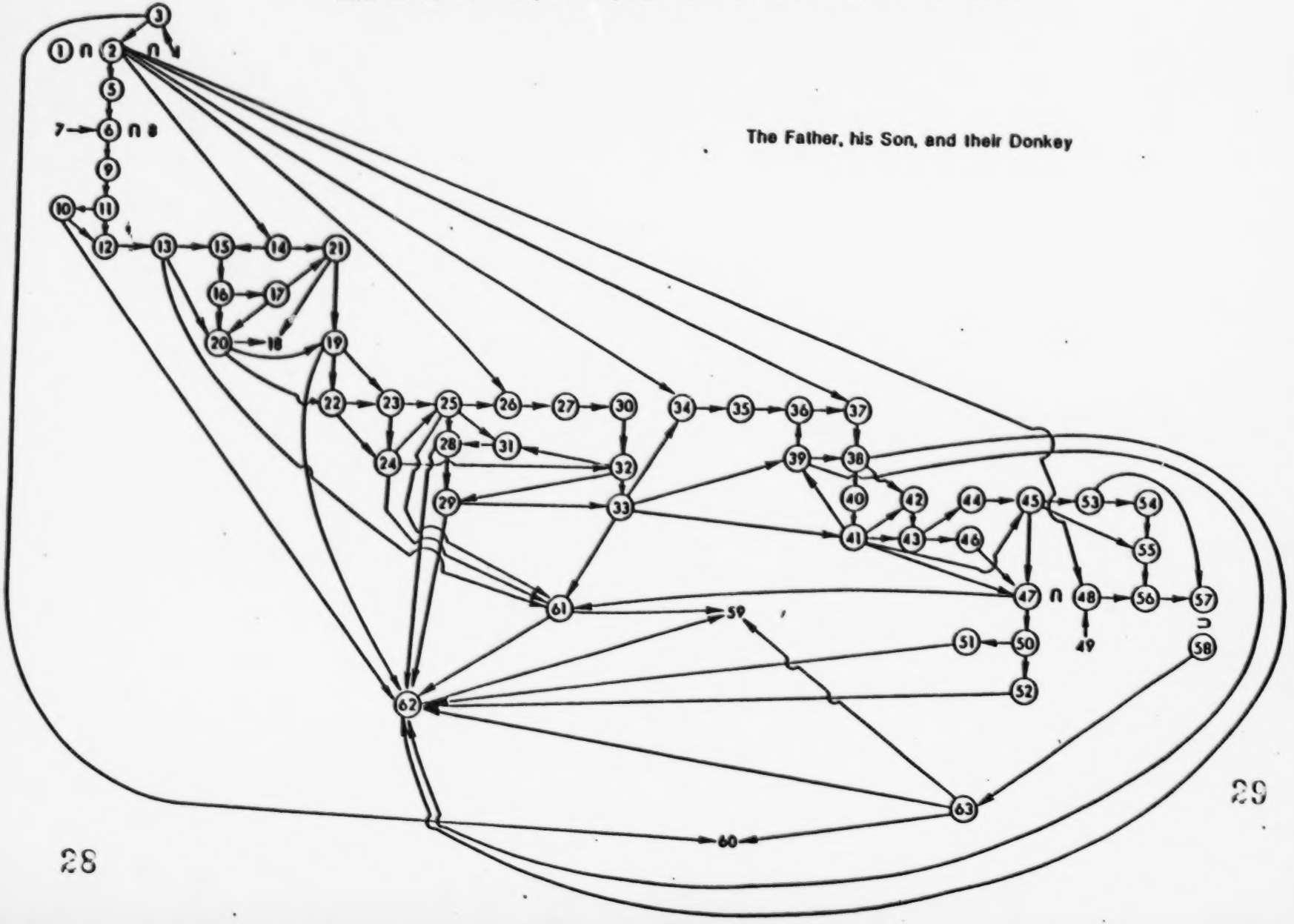


Figure 3. Causal network representation for the Hierarchical Version of the Jimmy Story (from van den Broek, 1985).

Figure 4. Causal network representation for the Father, his Son, and their Donkey story (from Trabasso & Sperry, 1985).



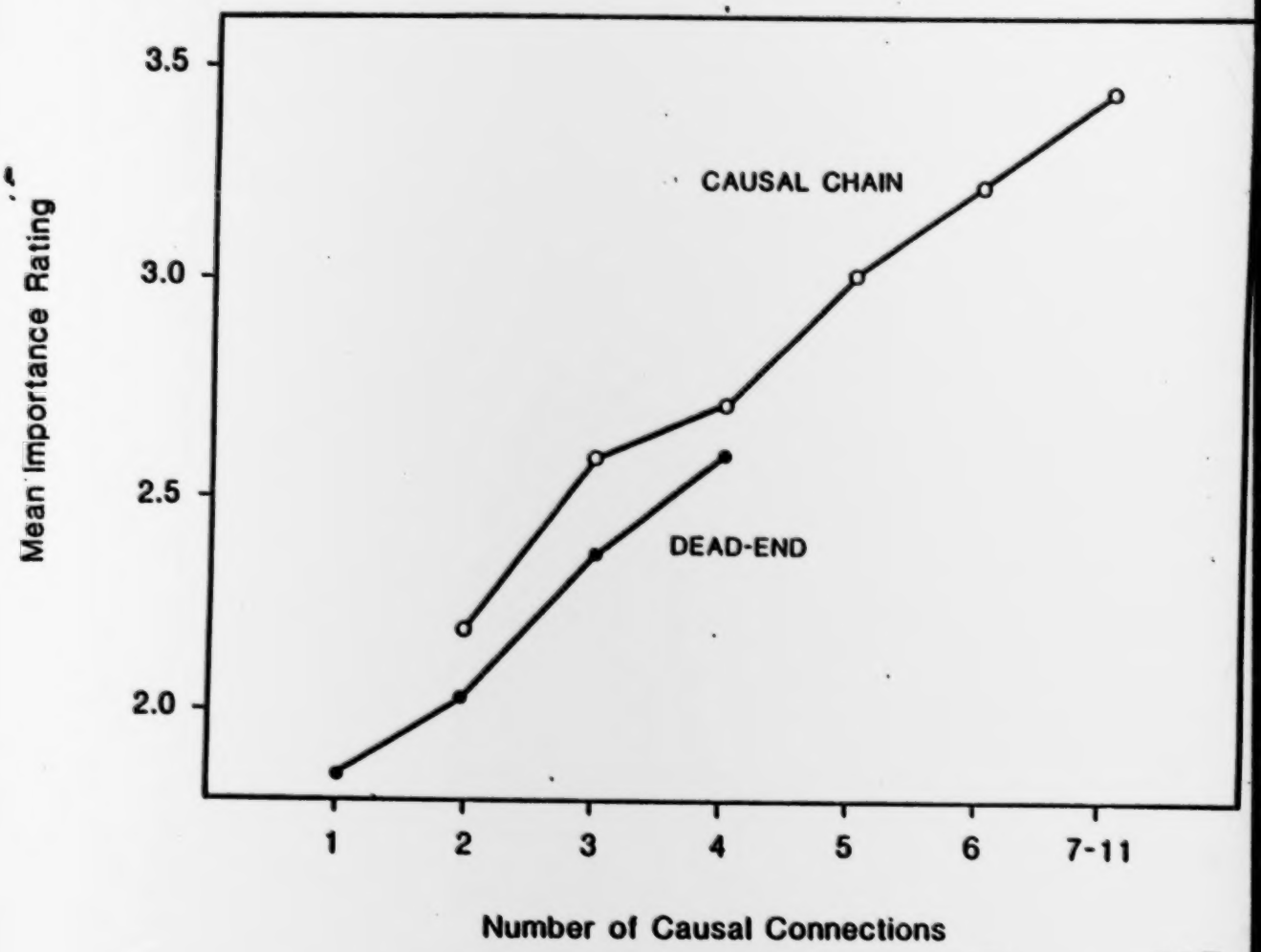


Figure 5. The relation between importance ratings and number of causal connections of a story statement (data from Trabasso & Sperry, 1985).

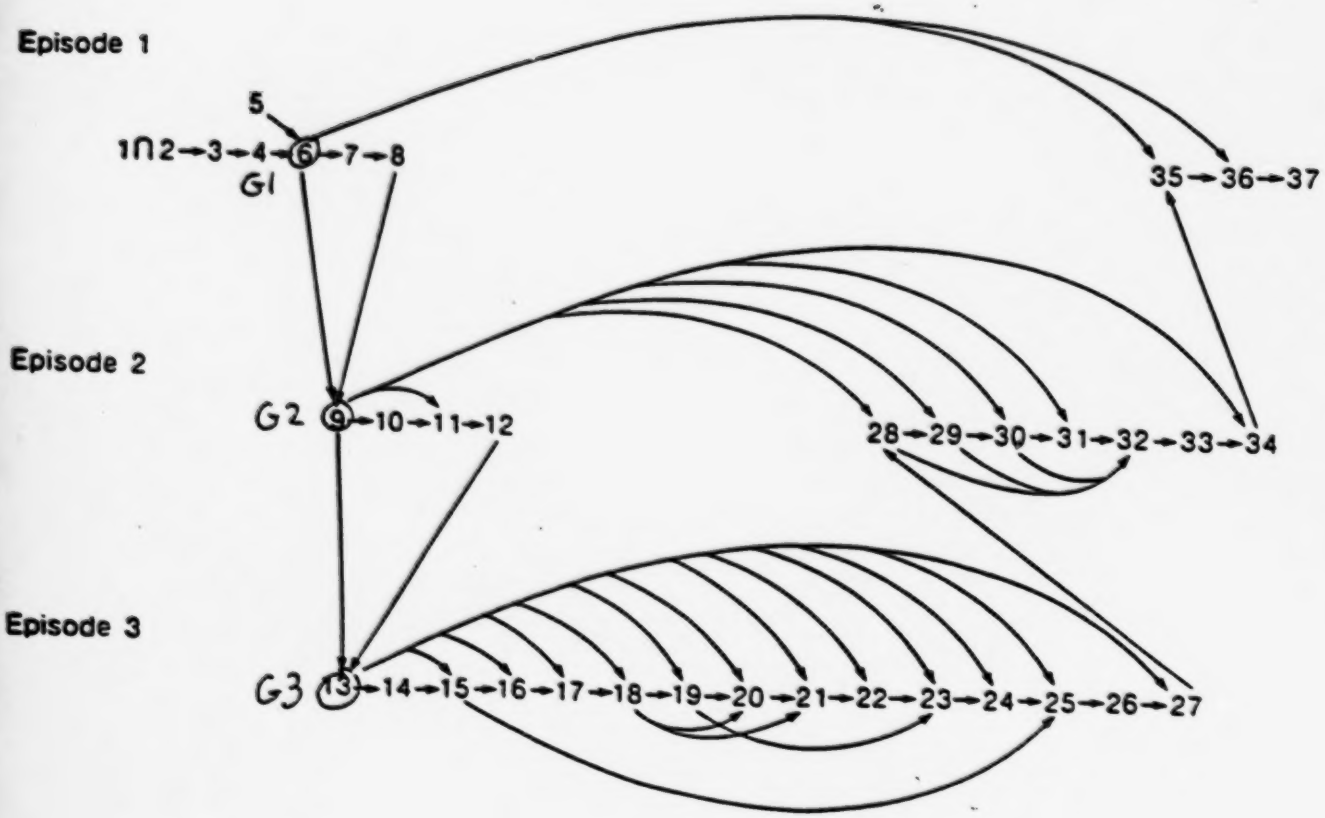


Figure 6. Representation of the Increasing Connection Hierarchical Jimmy Story (from van den Broek, 1985).

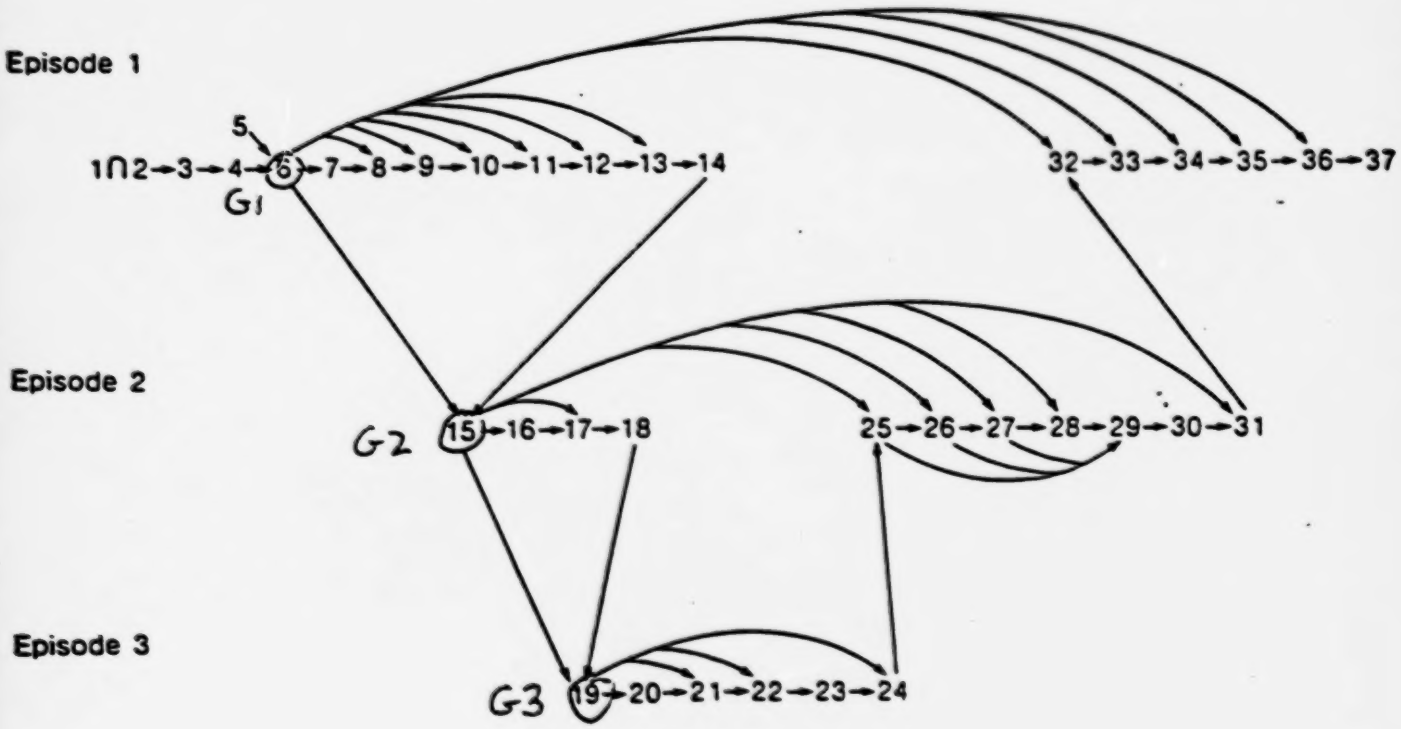


Figure 7. Representation of the Decreasing Connection Hierarchical Jimmy Story (from van den Broek, 1985).

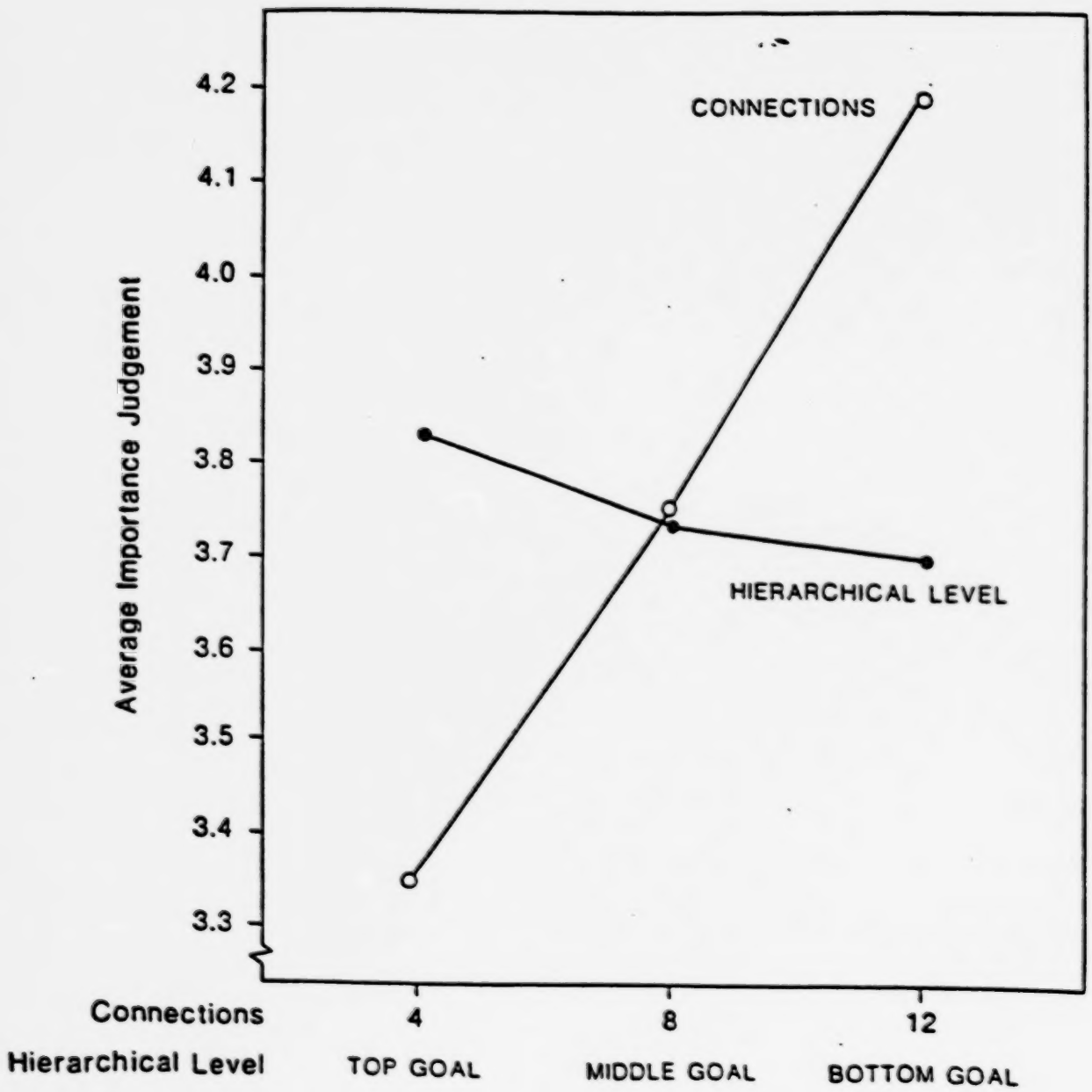


Figure 8. Goal statement importance as a function of causal connections and hierarchical level (data from van den Broek, 1985).